D
PART I

LEXSEE 2000 U.S. DISTRICT LEXIS 2822

ACCUSCAN, INC., Plaintiff,–against–XEROX CORP., Defendant.

96 Civ. 2579 (HB)

UNITED STATES DISTRICT COURT FOR THE SOUTHERN DISTRICT OF NEW YORK

2000 U.S. Dist. LEXIS 2822

March 14, 2000, Decided
March 15, 2000, Filed

DISPOSITION: [*1] Xerox's motion for judgment as matter of law or for new trial DENIED.

CASE SUMMARY:

PROCEDURAL POSTURE: Defendant moved for judgment as matter of law pursuant to *Fed. R. Civ. P. 50(b)* or for new trial pursuant to *Fed. R. Civ. P. 59* after jury found for plaintiff in patent case. Plaintiff moved for prejudgment interest pursuant to *Fed. R. Civ. P. 50(b)* and taxation of costs.

OVERVIEW: Defendant contended it was entitled to judgment or the issue of actual notice, damages, and the patent's invalidity. A judgment as a matter of law for defendant would be a miscarriage of justice because there was ample evidence to support the jury's verdict and there was not overwhelming evidence in favor of defendant. Defendant's motion for a new trial was misguided because defendant was essentially attempting to reargue the claims it raised at trial. Prejudgment interest was awarded to plaintiff based on the 52–week Treasury Bill rate because plaintiff failed to convince the court that the prime rate should be utilized nor did the evidence warrant the application of that rate. Plaintiff established that the depositions taxed were used for the purposes of impeachment at trial and for use with other witnesses who testified, thus they were reasonably necessary to plaintiff and costs for the transcripts were properly taxed.

OUTCOME: Defendant's motions were denied because ample evidence supported jury's verdict and defendant was simply rearguing claims it raised at trial; prejudgment interest awarded to plaintiff at 52–week Treasury Bill rate because prime rate was not warranted and deposition transcript costs were properly taxed.

LexisNexis(R) Headnotes

Civil Procedure > Trials > Judgment as Matter of Law
[HN1] Pursuant to *Fed. R. Civ. P. 50(b)*, a court should only grant a motion for judgment as a matter of law when (1) there is such a complete absence of evidence supporting the verdict that the jury's findings could only have resulted from sheer surmise and conjecture, or (2) there is such an overwhelming amount of evidence in favor of the movant that reasonable and fair minded people could not have reached a verdict against moving party. The court must consider all the evidence in a light most favorable to the non–mover, must draw reasonable inferences favorable to the non–mover, and must not substitute its choice for that of the jury between conflicting elements in the evidence.

Civil Procedure > Relief From Judgment > Motions for New Trial
[HN2] *Fed. R. Civ. P. 59* governs the decision whether to grant a new trial, a decision which is committed to the sound discretion of the trial judge. The power of a trial court to grant a new trial based on the weight of the evidence is limited to instances where the jury's verdict can be seen as seriously erroneous, or the verdict is a miscarriage of justice.

Civil Procedure > Relief From Judgment > Motions for New Trial
[HN3] A party cannot use *Fed. R. Civ. P. 59* as way of rearguing claims raised at trial.

Patent Law > Remedies > Collateral Assessments > Prejudgment Interest
Patent Law > Remedies > Damages > Reasonable Royalties
[HN4] An award of prejudgment interest aims to place the patent owner in as good a position as it would have been in had the infringer entered into a reasonable royalty agreement. The determination of the rate at which prejudgment interest is awarded is left to the sound discretion of the trial court.

Patent Law > Remedies > Collateral Assessments > Attorney Fees

[HN5] The decision on taxation of costs is left solely to the discretion of the trial judge. The prevailing party has the burden of establishing that the taxation of costs is justified.

Civil Procedure > Costs & Attorney Fees > Litigation Costs

[HN6] With respect to deposition transcripts, U.S. Dist. Ct., S.D.N.Y., R. 54.1(c)(2) provides that unless otherwise ordered by the court, the original transcript of a deposition, plus one copy, is taxable if the deposition was used or received in evidence at the trial, whether or not it was read in its entirety. Costs for depositions are also taxable if they were used by the court in ruling on a motion for summary judgment or other dispositive substantive motion.

Civil Procedure > Costs & Attorney Fees > Litigation Costs

[HN7] In the Second Circuit, a deposition transcript may be taxed when it appears to be reasonably necessary to the parties at the time taken.

Civil Procedure > Costs & Attorney Fees > Litigation Costs

[HN8] For purposes of assessing deposition transcript costs, depositions are considered used if they were submitted as part of a summary judgment motion and considered by the court in reaching its decision, even if they are not cited by the court.

COUNSEL: For ACCUSAN, INC., plaintiff: Xerox Corporation, Hill, Betts & Nash, NY, NY.

For ACCUSAN, INC., plaintiff: John Francis Sweeney, Morgan & Finnegan, NY, NY.

For XEROX CORP., defendant: Thomas L. Creel, Kaye, Scholer, Fierman, Hays & Handler, LLP, New York, NY.

For XEROX CORP., counter-claimant: Thomas L. Creel, Kaye, Scholer, Fierman, Hays & Handler, LLP, New York, NY.

For ACCUSAN, INC., counter-defendant: Xerox Corporation, Hill, Betts & Nash, NY, NY.

For ACCUSAN, INC., counter-defendant: John Francis Sweeney, Morgan & Finnegan, NY, NY.

JUDGES: Harold Baer, Jr., U.S.D.J.

OPINIONBY: Harold Baer, Jr.

OPINION:

OPINION AND ORDER

Hon. Harold Baer, Jr., District Judge:

The jury rendered a verdict in this patent case on October 25, 1999 in favor of plaintiff AccuScan, Inc. ("AccuScan") for $9,716,379 after a second trial devoted to damages, and the issues of notice and the "on sale" bar. Xerox now moves pursuant to Rule 50(b) for judgment as a matter of law or, alternatively, requests a new trial pursuant to Rule 59. AccuScan moves pursuant to Rule 50(b) for the entry of prejudgment interest, and also seeks the taxation of costs against the defendant.

For the reasons stated below, Xerox's motion for judgment as a matter of law or for a new trial is DENIED. Further, AccuScan is awarded prejudgment interest in the amount of $4,689,544.16, and is awarded costs in the amount of $45,874.83. The facts of this action are set out at length in my prior decisions and familiarity is assumed.

DISCUSSION

I. XEROX'S MOTION FOR JUDGMENT AS A MATTER OF LAW OR, ALTERNATIVELY, FOR A NEW TRIAL

[HN1] Pursuant to *Fed. R. Civ. P. 50(b)*, a court should [*2] only grant a motion for judgment as a matter of law when: (1) there is "such a complete absence of evidence supporting the verdict that the jury's findings could only have resulted from sheer surmise and conjecture," or (2) there is such an "overwhelming amount of evidence in favor of the movant that reasonable and fair minded" people could not have reached a verdict against moving party. *Samuels v. Air Transport Local 504, 992 F.2d 12, 14 (2d Cir. 1993)*(internal citations omitted). The Court "must consider all the evidence in a light most favorable to the non-mover, must draw reasonable inferences favorable to the non-mover, and must not substitute its choice for that of the jury between conflicting elements in the evidence." *Ortho Diagnostic Systems, Inc. v. Miles Inc., 865 F. Supp. 1073, 1078 (S.D.N.Y. 1994)*, appeal dismissed, *48 F.3d 1237 (Fed. Cir. 1995)*. [HN2] *Federal Rule of Civil Procedure 59* governs the decision whether to grant a new trial, a decision which is "committed to the sound discretion of the trial judge." *Metromedia Co. v. Fugazy, 983 F.2d 350, 363 (2d Cir.1992)*, cert. denied, *508 U.S. 952, 124 L. Ed. 2d 662, 113 S. Ct. 2445 (1993)*. [*3] The power of a district court to grant a new trial based on the weight of the evidence is limited to instances where the jury's verdict can be seen as "seriously erroneous," *Piesco v. Koch, 12 F.3d 332, 344 (2d Cir.1993)*, or the verdict "is a miscarriage of justice." *Purnell v. Lord, 952 F.2d 679,*

686 (2d Cir. 1992) (citation omitted).

Xerox claims that it is entitled to judgment as a matter of law on the issues of actual notice, damages, and the patent's invalidity (the "on sale" bar). It argues that no reasonable jury could have concluded that AccuScan provided actual notice of infringement with regard to the SA4 scanner, 5775 color copier, and DocuTech system; that no reasonable jury could have concluded that AccuScan was entitled to damages based on the entire market value rule; and that no reasonable jury could have concluded that the patented invention was valid, because it was "on sale" one year prior to the actual date of filing the patent application and that the patent was ready for patenting. Further, Xerox seeks a new trial on the ground that this Court abused its discretion in limiting certain testimony at trial.

A judgment as a matter [*4] of law for the defendant in this case would be a miscarriage of justice. There is ample evidence to support the jury's verdict, and the test, i.e. that there be an "overwhelming amount of evidence" in favor of Xerox, was just not met. The jury was presented with evidence by both sides on each issue and, in my humble opinion, did precisely what is was supposed to do. It weighed the evidence and assessed the credibility, and Xerox came up short. Therefore, Xerox's motion for judgment as a matter of law is denied.

In addition, Xerox's Rule 59 motion is misguided. The excluded testimony was the subject of a motion *in limine*, and was addressed at length before and during trial. Xerox has presented nothing new in its post-trial motion to convince me that ruling was "seriously erroneous" and resulted in a "miscarriage of justice." [HN3] Because a party cannot use Rule 59 as way of rearguing claims raised at trial, see *Sassower v. Field, 973 F.2d 75, 81 (2d Cir. 1992)* (affirming denial of motion for new trial where motion was mere reargument of claims made at trial), cert. denied, *507 U.S. 1043, 123 L. Ed. 2d 497, 113 S. Ct. 1879 (1993)*, Xerox's motion for [*5] a new trial is denied.

II. PREJUDGMENT INTEREST

AccuScan moves this Court to modify the judgment entered to reflect an award of prejudgment interest. While Xerox agrees that AccuScan is entitled to prejudgment interest, the parties dispute the rate at which interest is to be awarded. AccuScan seeks prejudgment interest to be awarded based on the prime rate, compounded quarterly, which yields a total of $7,373,979.00. n1 In contrast, Xerox claims that prejudgment interest should be based on the 52-week Treasury Bill rate, compounded annually, which yields a total of $4,689,544.16.

n1 In its motion for prejudgment interest, Accuscan's memorandum states that it seeks a total amount of $7,379,979.00, yet its proposed order states a total amount of $7,381,567.00.

[HN4] An award of prejudgment interest aims to place the patent owner "in as good a position as [it] would have been in had the infringer entered into a reasonable royalty agreement." *General Motors Corp. v. Devex Corp., 461 U.S. 648, 655-56, 76 L. Ed. 2d 211, 103 S. Ct. 2058 (1983).* [*6] The determination of the rate at which prejudgment interest is awarded is left to the sound discretion of the trial court. See *Laitram Corp. v. NEC Corp., 115 F.3d 947, 955 (Fed. Cir. 1997); Gyromat Corp. v. Champion Spark Plug Corp., 735 F.2d 549, 556 (Fed. Cir. 1984)* (court has "substantial discretion" to determine the interest rate).

Here, a review of the record establishes that prejudgment interest awarded at the 52-week Treasury Bill rate, compounded annually, will adequately compensate AccuScan. This is the same rate set forth for awards of post-judgment interest, see *28 U.S.C. § 1961*, and has often been employed by the Federal Circuit and other courts in awarding prejudgment interest in patent cases. See, e.g., *Laitram Corp., 115 F.3d at 955* (prejudgment interest at Treasury bill rate, compounded annually); *Datascope Corp. v. SMEC, Inc., 879 F.2d 820, 829 (Fed. Cir. 1989)* (affirmed interest awarded at rate set forth in § 1961); *Intex Plastic Sales Co. v. Hall, 1991 U.S. Dist. LEXIS 20476, 20 U.S.P.Q.2D (BNA) 1367, 1371 (N.D. Cal. 1991)* (interest awarded at rate set forth [*7] in § 1961, where applying higher rate was "'too speculative"), aff'd, *960 F.2d 155 (Fed. Cir. 1992); Polaroid Corp. v. Eastman Kodak Co., 1990 U.S. Dist. LEXIS 17968, 16 U.S.P.Q.2D (BNA) 1481, 1541 (D. Mass. 1990)* (interest awarded at Treasury Bill rate, compounded annually, where evidence failed to justify higher rate). AccuScan's arguments fail to convince me that the prime rate should be utilized, nor does the evidence warrant the application of that rate. Accordingly, prejudgment interest is awarded to AccuScan based on the 52-week Treasury Bill rate, compounded annually, in the amount of $4,689,544.16.

III. TAXATION OF COSTS

The Judgment Clerk for the Southern District of New York awarded costs to AccuScan in the amount of $45,874.83 on December 10, 1999. Xerox objects to the taxation of costs for certain deposition transcripts and related witness fees, and seeks a reduction in costs of $10,704.37. n2 According to Xerox, these costs were not reasonably and necessarily incurred by AccuScan in presenting its case at trial, and should therefore be stricken.

n2 Specifically, these depositions were: Leonard Zuckerman, Peter Miller, David Haas, Charles Jacobson, Roy Lahr, Robert Yerman, Carl Kolker, George Stamps, and Robert Krallinger.

----------End Footnotes----------[HN5]

[*8]

The decision on taxation of costs is left solely to the discretion of the trial judge. *LoSacco v. City of Middleton, 71 F.3d 88, 92 (2d Cir. 1995)* (citing *Farmer v. Arabian Oil Co., 379 U.S. 227, 232-233, 13 L. Ed. 2d 248, 85 S. Ct. 411 (1964))*. The prevailing party has the burden of establishing that the taxation of costs is justified. *John and Kathryn G v. Board of Educ. of Mount Vernon Public Schools, 891 F. Supp. 122, 123 (S.D.N.Y. 1995)*. [HN6] With respect to deposition transcripts, Local Rule 54.1(c)(2) reads in pertinent part:

> Unless otherwise ordered by the court, the original transcript of a deposition, plus one copy, is taxable if the deposition was used or received in evidence at the trial, whether or not it was read in its entirety. Costs for depositions are also taxable if they were used by the court in ruling on a motion for summary judgment or other dispositive substantive motion.

Xerox argues that several of the deposition transcripts taxed were never "used" at trial by AccuScan in presenting its case, but were used solely by the parties for impeachment purposes or merely referred to during questioning. [*9] Further, Xerox objects to certain other transcripts taxed, which were cited by Xerox in its Statement of Undisputed Facts as part of its summary judgment motion, but which were not cited by this Court in its order denying summary judgment.

[HN7] In this Circuit, a deposition transcript may be taxed when it appears to be reasonably necessary to the parties at the time taken. See *DeHoust v. Baxter Healthcare Corp., 1999 U.S. Dist. LEXIS 6379, 1999 WL 280423 (S.D.N.Y. 1999)* (costs of transcripts allowed because depositions appeared to be reasonably necessary at time taken); *United States Football League v. National Football League, 704 F. Supp. 474, 487 (S.D.N.Y. 1989)*. Here, AccuScan has established that the depositions taxed were used for purposes of impeachment at trial and for use with other witnesses who testified. Therefore, these depositions were "reasonably necessary" to AccuScan, and costs for those transcripts were properly taxed. Finally, [HN8] depositions are considered "used" if they were submitted as part of a summary judgment motion and considered by the Court in reaching its decision, even if they are not cited by the Court. See *Walther v. Maricopa Int'l Inv. Corp., 1999 U.S. Dist. LEXIS 15812, *8, 1999 WL 816176,* [*10] *2 (S.D.N.Y. 1999)*. Therefore, costs taxed for deposition transcripts utilized in the motion for summary judgment were also properly taxed. Accordingly, AccuScan is entitled to the full amount of $45,874.83 taxed as costs.

CONCLUSION

For the foregoing reasons, Xerox's motion for judgment as a matter of law or, alternatively, for a new trial is DENIED. AccuScan is awarded prejudgment interest in the amount of $4,689,544.16, and is further awarded costs in the amount of $45,874.83. The Clerk of the Court is instructed to close this case.

SO ORDERED.

New York, New York
March 14, 2000

Harold Baer, Jr.

U.S.D.J.

LEXSEE 1998 U.S. DIST. LEXIS 3833

AJINOMOTO CO., INC., Plaintiff, v. ARCHER-DANIELS-MIDLAND CO., Defendant.

C.A. No. 95-218-SLR

UNITED STATES DISTRICT COURT FOR THE DISTRICT OF DELAWARE

1998 U.S. Dist. LEXIS 3833

March 13, 1998, Decided

NOTICE: [*1] FOR ELECTRONIC PUBLICATION ONLY

DISPOSITION: Ajinomoto's request for attorneys' fees denied. Permanent injunction granted preventing ADM from infringing '765 patent.

CASE SUMMARY:

PROCEDURAL POSTURE: Plaintiff inventor filed a patent action pursuant to *35 U.S.C.S. § 271* against defendant alleged infringer and requested an injunction and lost royalty income.

OVERVIEW: The inventor patented a method of preparation of bacterial strains in Russia, published a scientific paper that discussed the process, and then later patented the method in the United States. It filed action against the alleged infringer pursuant to *35 U.S.C.S. § 271*(g) and sought a permanent injunction and royalties. The court found infringement of a valid patent because inventor's patent properly set forth the best mode contemplated by the inventor and because the disclosure was adequate to enable one skilled in the art to practice the best mode. Furthermore, the infringer failed to show that the patent specification did not meet the enablement requirement because it failed to show that the inventor made the biological strains unavailable. The court granted the injunction and ordered royalties based upon a hypothetical royalty for the use of patented technology calculated as if the parties negotiated at arm's length.

OUTCOME: The court found that the alleged infringer did infringe the inventor's patent. The court granted a permanent injunction and ordered payment of lost royalty income and prejudgment interest.

LexisNexis(R) Headnotes

Patent Law > Date of Invention & Priority > Activities Abroad

Patent Law > Statutory Bars > Foreign Patenting

[HN1] See *35 U.S.C.S. § 119*.

Civil Procedure > Justiciability > Standing
Patent Law > Ownership > Conveyances > Assignments
Patent Law > Infringement Actions > Infringing Acts > General Overview

[HN2] Standing is a threshold question in every federal case, determining the power of the court to entertain suit. The party invoking federal jurisdiction bears the burden of fulfilling the standing requirement. According to *35 U.S.C.S. § 281*, a civil action for infringement may be brought by a patentee, which is defined to include not only the patentee to whom the patent was issued but also the successors in title to the patentee, under *35 U.S.C.S. § 100*(d). Pursuant to *35 U.S.C.S. § 261*, patents, and any interests therein, are assignable in law by an instrument in writing. An assignee of the rights under a patent is deemed the effective patentee under *35 U.S.C.S. § 281* and has standing to bring suit in its own name for infringement.

Patent Law > Infringement Actions > Infringing Acts > General Overview

[HN3] See *35 U.S.C.S. § 271*(g).

Patent Law > Infringement Actions > Claim Interpretation > Scope
Patent Law > Infringement Actions > Infringing Acts > General Overview

[HN4] There is a two-step analysis for determining whether a patent claim is infringed. First, the claim must be properly construed to determine its scope and meaning. Second, the claim as properly construed must be compared to the accused device or process.

Patent Law > Infringement Actions > Claim Interpretation > General Overview

[HN5] Courts are directed to consider three sources to ascertain the meaning of a claim: The literal language of the claim, the patent specification, and the prosecution history. When interpreting the words of the claim, the court should ascribe to the words their ordinary meaning unless

it appears the inventor used them otherwise. The words of the claim must be construed in the light of the specification, whose description may act as a sort of dictionary, which explains the invention and may define terms used in the claims. The court should also consider the patent's prosecution history, as it constitutes an undisputed public expression of what the patentee understood in terms of claim construction.

Patent Law > U.S. Patent & Trademark Office Proceedings > Reissues > General Overview
Patent Law > Infringement Actions > Claim Interpretation > General Overview
[HN6] For claim interpretation, the court may, in its discretion, consider extrinsic evidence to assist in its construction of the written document, a task it is required to perform. Extrinsic evidence consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises. Neither the patent's prosecution history nor any extrinsic evidence considered can enlarge, diminish, or vary the limitations in the claims.

Patent Law > Inequitable Conduct > General Overview
Patent Law > Utility Requirement > General Overview
Patent Law > Infringement Actions > Infringing Acts > General Overview
[HN7] In order for a product to be considered materially changed, there must be a real difference between the product imported, offered for sale, sold, or used in the United States and the products produced by the patented process. Modification of the product of a patented process does not constitute material change if the process claim encompasses both the unmodified and modified product forms.

Patent Law > Nonobviousness > Evidence & Procedure > Fact & Law Issues
Patent Law > Nonobviousness > Evidence & Procedure > Presumptions & Proof
Patent Law > Inequitable Conduct > General Overview
[HN8] A patent is presumed valid, and the burden of proving invalidity, whether under *35 U.S.C.S. § 112* or otherwise, rests with the challenger. Invalidity must be proven by facts supported by clear and convincing evidence. The issues of enablement and obviousness are questions of law; however, a determination of enablement or obviousness is based on factual inquiries.

Patent Law > Nonobviousness > Elements & Tests > Prior Art
Patent Law > Nonobviousness > Elements & Tests > Claimed Invention as a Whole
Patent Law > Nonobviousness > Elements & Tests > Ordinary Skill Standard
[HN9] A patent is invalid under *35 U.S.C.S. § 103* if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patent Law > Nonobviousness > Elements & Tests > Prior Art
Patent Law > Nonobviousness > Elements & Tests > Secondary Considerations
Patent Law > Nonobviousness > Elements & Tests > Ordinary Skill Standard
[HN10] Obviousness under *35 U.S.C.S. § 103* is a legal conclusion based on several factual inquiries: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of nonobviousness. Secondary considerations include evidence of factors tending to show nonobviousness, such as commercial success of the invention, satisfying a long-felt need, failure of others to find a solution to the problem at hand, and copying of the invention by others. The burden of showing, by clear and convincing evidence, the invalidity of patent claims is especially difficult when the prior art was before the Patent Trademark Office (PTO) examiner during the prosecution of the application. However, where there is no PTO view on obviousness in view of the asserted references, the burden of proof is more easily carried. Nevertheless, the burden of proof on invalidity remains with the party challenging the patent.

Patent Law > Nonobviousness > Elements & Tests > Prior Art
Patent Law > Nonobviousness > Elements & Tests > Claimed Invention as a Whole
Patent Law > Nonobviousness > Evidence & Procedure > General Overview
[HN11] When obviousness is based on prior art references, there must be a showing of a suggestion or motivation to modify the teachings of those references. This suggestion to modify the art need not be expressly stated in the references, rather the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. Hindsight reconstruction and/or the blueprint drawn by the inventor may not be used to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. The question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.

Patent Law > Nonobviousness > Elements & Tests > Ordinary Skill Standard
Patent Law > Nonobviousness > Elements & Tests >

Prior Art
Patent Law > Claims & Specifications > Enablement Requirement > General Overview
[HN12] Prior art is defined as knowledge that is available, including what would be obvious from it, at a given time, to a person of ordinary skill in an art.

Patent Law > Nonobviousness > Elements & Tests > General Overview
[HN13] The test for determining whether a prior art reference was publicly available is whether it has been disseminated or otherwise made available to the extent that persons interested and of ordinary skill in the subject matter or art exercising reasonable diligence can locate it. Although the determination of public accessibility is to made on a case-by-case basis, certain guidelines have emerged. The requirement may be met by distributing or making the paper available at a conference where members of the interested public are told of the paper's existence and informed of its contents.

Patent Law > Claims & Specifications > Enablement Requirement > General Overview
Patent Law > Nonobviousness > Elements & Tests > General Overview
[HN14] There are six factors a court should consider in determining the level of ordinary skill in the art: (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) the prior art solutions; (4) the rapidity of innovation; (5) the sophistication of the technology at issue; and (6) the educational level of active workers in the field.

Patent Law > Nonobviousness > Elements & Tests > General Overview
[HN15] Objective indicia of nonobviousness must be considered before a conclusion on obviousness can be made.

Patent Law > Claims & Specifications > Best Mode > General Overview
[HN16] Title *35 U.S.C.S. § 112* provides in relevant part that the specification shall set forth the best mode contemplated by the inventor of carrying out his invention.

Patent Law > Claims & Specifications > Best Mode > Adequate Disclosure
Patent Law > Claims & Specifications > Enablement Requirement > Standards & Tests
Patent Law > Date of Invention & Priority > General Overview
[HN17] The best mode requirement has two components: The first is a subjective one, asking whether, at the time the inventor filed his patent application, he contemplated a best mode of practicing his invention. If he did, the second inquiry is whether his disclosure is adequate to enable one skilled in the art to practice the best mode or, in other words, whether the best mode has been concealed from the public. The best mode requirement means that there must be no concealment of a mode known by the inventor to be better than that which is disclosed. Specific intent to deceive is not a required element of the best mode defense. Any concealment of the best mode, whether accidental or intentional, is a violation of the best mode requirement.

Patent Law > Claims & Specifications > Best Mode > Adequate Disclosure
Patent Law > Claims & Specifications > Enablement Requirement > General Overview
Patent Law > Claims & Specifications > Description Requirement > General Overview
[HN18] One must consider the level of skill in the relevant art in determining whether a specification discloses the best mode. Whether a best mode disclosure is adequate, that is, whether the inventor concealed a better mode of practicing his invention than he disclosed, is a function of not only what the inventor knew but also how one skilled in the art would have understood his disclosure.

Patent Law > Claims & Specifications > Enablement Requirement > Standards & Tests
Patent Law > Claims & Specifications > Description Requirement > Elements
Patent Law > Inequitable Conduct > General Overview
[HN19] Title *35 U.S.C.S. § 112* mandates that a patent's specification contain a written description of the invention, and of the manner and process of making and using it, in such full, clear concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same. This section requires that there be sufficient disclosure, either through illustrative examples or written description, to teach one skilled in the art how to make and use the invention as broadly as it is claimed. However, it is not necessary that a patent applicant test all the embodiments of his invention; what is necessary is that he provide a disclosure sufficient to enable one skilled in the art to carry out the invention commensurate with the scope of his claims.

Patent Law > Claims & Specifications > Enablement Requirement > General Overview
[HN20] The fact that some experimentation is necessary does not preclude enablement as long as the amount of experimentation is reasonable given the nature of the invention and the state of the art. The determination of what constitutes undue experimentation in a given case requires the application of a standard of reasonableness, having due regard for the nature of the invention and the state of the art. The test is not merely quantitative, since a considerable amount of experimentation is permissible, if it is merely routine, or if the specification in question pro-

vides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed.

Patent Law > Claims & Specifications > Enablement Requirement > General Overview

[HN21] Factors to be considered in determining whether a disclosure would require undue experimentation include (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.

Patent Law > Inequitable Conduct > General Overview
Patent Law > Claims & Specifications > Enablement Requirement > General Overview

[HN22] The placement of microorganism samples in a public depository is adequate to satisfy the enablement requirement of *35 U.S.C.S § 112*, when a written description alone would not place the invention in the hands of the public and physical possession of a unique biological material is required. A deposit has been held necessary for enablement where the starting materials, such as living cells used to practice the invention, or cells from which the required cells can be produced, are not readily available to the public. Even when starting materials are available, a deposit has been necessary where it would require undue experimentation to make the cells of the invention from the starting materials.

Patent Law > Claims & Specifications > Enablement Requirement > General Overview
Patent Law > Claims & Specifications > Description Requirement > General Overview

[HN23] For enablement, when a biological sample required for the practice of an invention is obtained from nature, the invention may be incapable of being practiced without access to that organism. Hence the deposit is required in that case. On the other hand, when the organism is created by insertion of genetic material into a cell obtained from generally available sources, then all that is required is a description of the best mode and an adequate description of the means of carrying out the invention, not deposit of the cells. If the cells can be prepared without undue experimentation from known materials, based on the description in the patent specification, a deposit is not required.

Patent Law > Originality > Joinder of Inventors
Patent Law > U.S. Patent & Trademark Office Proceedings > Filing Requirements > Oaths
Patent Law > Date of Invention & Priority > General Overview

[HN24] As part of a patent application, the inventor or inventors are required to sign the inventor's oath and declaration. Specifically, *35 U.S.C.S. § 115* provides that the applicant shall make oath that he believes himself to be the original and first inventor of the process for which he solicits a patent. Title *35 U.S.C.S. § 116* provides that when an invention is made by two or more persons jointly, they shall apply for a patent jointly and each make the required oath. Statutory exceptions to these requirements are found in *35 U.S.C. §§ 116*–118 and implemented at *37 C.F.R. §§ 1.42* and *1.47*. These exceptions allow someone other than the inventor to sign the oath and declaration if the inventor is dead, insane or legally incapacitated, refuses to sign, or cannot be found or reached after diligent effort.

Patent Law > Originality > Correction of Inventorship Errors

[HN25] See *35 U.S.C.S. § 116*.

Patent Law > Originality > Joinder of Inventors

[HN26] See *35 U.S.C.S. § 117*.

Patent Law > U.S. Patent & Trademark Office Proceedings > Filing Requirements > General Overview

[HN27] See *35 U.S.C.S. § 118*.

Patent Law > Originality > Joinder of Inventors
Patent Law > Originality > Correction of Inventorship Errors

[HN28] See *35 U.S.C.S. § 251*.

Patent Law > Originality > Correction of Inventorship Errors

[HN29] See *35 U.S.C.S. § 256*.

Patent Law > Inequitable Conduct > Effect, Materiality & Scienter > Elements
Patent Law > Inequitable Conduct > Burdens of Proof
Patent Law > Inequitable Conduct > Effect, Materiality & Scienter > Effect of Inequitable Conduct

[HN30] The defense of inequitable conduct requires proof, by clear and convincing evidence, of the failure to disclose material information that was known or should have been known to the patentee or the submission of false material information to the Patent Trademark Office with the intent to mislead.

Patent Law > Inequitable Conduct > Effect, Materiality & Scienter > General Overview

[HN31] There is a two-step analysis for evaluating the defense of inequitable conduct: First, the trial court must discern whether the withheld references satisfy a threshold level of materiality. The court must also determine whether the applicant's conduct satisfies a threshold showing of intent to mislead. Next, assuming satisfaction of the thresholds, the trial court must balance materiality and intent. The more material the omission, the less culpable the intent required, and vice versa. The determination of inequitable conduct is within the discretion of the trial

court.

Patent Law > Inequitable Conduct > Effect, Materiality & Scienter > General Overview

[HN32] Facts or information is material if there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent.

Patent Law > Inequitable Conduct > Burdens of Proof
Patent Law > Inequitable Conduct > Effect, Materiality & Scienter > General Overview

[HN33] Because direct evidence of intent of inequitable conduct is rarely available, intent may be inferred from clear and convincing evidence of the surrounding circumstances. However, the determination that an undisclosed reference is material does not presume an intent to deceive. Furthermore, a showing that references with some degree of materiality were not disclosed is insufficient to establish inequitable conduct.

Patent Law > Remedies > Damages > Reasonable Royalties
Patent Law > Inequitable Conduct > General Overview
Patent Law > Infringement Actions > General Overview

[HN34] The standard for damages for patent infringement is set forth in *35 U.S.C.S. § 284*. It provides that a patent owner whose patent has been infringed is entitled to damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer, together with interest and costs as fixed by the court. The reasonable royalty provision in the statute provides the floor below which damage awards may not fall. The claimant bears the burden of proof on the issue of damages.

Patent Law > Ownership > Conveyances > Royalties
Patent Law > Remedies > Damages > Patentholder Losses
Patent Law > Remedies > Damages > Reasonable Royalties

[HN35] A reasonable royalty is a measure of recovery intended to provide a just recovery to persons who for evidentiary or other reasons cannot prove lost profits or an established royalty. It is defined as a hypothetical royalty for the use of the patented technology by the infringer, calculated as if the parties negotiated at arm's length as a willing licensor and a willing licensee on the date when the infringement began.

Patent Law > Remedies > Damages > Reasonable Royalties
Patent Law > Ownership > Conveyances > General Overview

[HN36] To establish a reasonable royalty, where the parties were previously not willing, the court may consider additional factors to assist in the determination of adequate compensation for the infringement. These factors include royalties received by the patentee for the licensing of the patent in suit, opinion testimony of qualified experts, the patentee's relationship with the infringer, and other factors that might warrant higher damages.

Patent Law > Remedies > Damages > General Overview

[HN37] The determination of a reasonable royalty is based upon the totality of the evidence, and the court is not limited to selecting one or the other of the specific royalty figures urged by counsel as reasonable.

Patent Law > Remedies > Damages > General Overview

[HN38] Although a hypothetical negotiation is presumed to take place on the eve of first infringement, the court is permitted to consider facts and events that occurred after infringement began even though those facts could not have been known by the hypothesized negotiators.

Patent Law > Remedies > Collateral Assessments > Increased Damages
Patent Law > Remedies > Collateral Assessments > Attorney Fees
Patent Law > Infringement Actions > General Overview

[HN39] Pursuant to *35 U.S.C.S. § 284*, a court may in its discretion increase the damages up to three times the amount found or assessed. The Federal Circuit has set forth a two-step analysis a court should employ in exercising its discretion. First, the fact-finder must determine whether an infringer is guilty of conduct upon which increased damages may be based. If so, the court then determines, exercising its sound discretion, whether, and to what extent, to increase the damages award given the totality of the circumstances. A finding that an infringer acted willfully or in bad faith may entitle an aggrieved party to increased damages. Because an infringer's egregious conduct in infringement litigation is not related to the underlying act of infringement or the infringer's culpability, it is an insufficient basis on which to justify increased damages under *35 U.S.C.S. § 284*.

Patent Law > Inequitable Conduct > Effect, Materiality & Scienter > General Overview
Patent Law > Infringement Actions > Infringing Acts > Intent & Knowledge

[HN40] The test for willful infringement is whether, under all the circumstances, a reasonable person would prudently conduct himself with any confidence that a court might hold the patent invalid or not infringed. In examining the totality of the circumstances the court should consider 1) the infringer's deliberate copying of the ideas of another; 2) the infringer's knowledge of the patent rights of another; 3) any good faith belief of invalidity or non-infringement formed by the infringer after an investigation of the patent rights of another; and 4) the infringer's

behavior as a litigant.

Patent Law > Infringement Actions > Infringing Acts > General Overview

[HN41] Actual notice of another's patent rights imposes an affirmative duty of due care upon the potential infringer to avoid infringement. This duty includes seeking and obtaining competent legal advice before engaging in activity that may result in infringement. There is, however, no absolute requirement that a would-be defendant aware of another's patent obtain its own opinion letter in order to immunize itself from a finding of willful infringement. Instead, a court must look to the totality of the circumstances in determining whether an infringer discharged the duty of due care.

Patent Law > Remedies > Collateral Assessments > Attorney Fees

[HN42] Title *35 U.S.C.S. § 285* provides that in exceptional cases the court may award reasonable attorney fees to the prevailing party. The purpose of this section is to compensate the prevailing party for its monetary outlays in prosecution or defense of a suit where the conduct of the losing party is clearly inequitable. The Federal Circuit has broken the standard down into four parts: (1) the case must be exceptional; (2) the district court may exercise its discretion; (3) the fees must be reasonable; and (4) the fees may be awarded only to the prevailing party. In general, for a case to be deemed exceptional there must be some finding, by clear and convincing evidence, of unfairness, bad faith, inequitable conduct, vexatious litigation, or some similar exceptional circumstances.

Patent Law > Remedies > Damages > Reasonable Royalties

Patent Law > Remedies > Damages > Time Limitations

Patent Law > Remedies > Collateral Assessments > Prejudgment Interest

[HN43] When infringement is found, prejudgment interest should be awarded absent some justification for withholding such an award. Specifically the overriding purpose of affording patent owners complete compensation, an award of prejudgment interest is ordinarily warranted since in the typical case an award of prejudgment interest is necessary to ensure that the patent owner is placed in as good a position as he would have been in had the infringer entered into a reasonable royalty agreement. An award of interest from the time that the royalty payments would have been received merely serves to make the patent owner whole, since his damages consist not only of the value of the royalty payments but also of the forgone use of the money between the time of infringement and the date of judgement.

Civil Procedure > Costs & Attorney Fees > Judgment Interest

[HN44] District courts have great discretion in the selection of interest rates and may award interest at or above the prime rate.

Patent Law > Remedies > Equitable Relief > Injunctions

Patent Law > Infringement Actions > Defenses > Estoppel & Laches > General Overview

[HN45] Pursuant to *35 U.S.C.S. § 283,* the court is authorized to grant injunctions in accordance with the principles of equity to prevent the violation of any right secured by patent, on such terms as the court deems reasonable. Although the grant of an injunction is discretionary, generally courts will grant injunctive relief when infringement has been determined. The Federal Circuit has indicated that once a finding of infringement has been made an injunction should issue absent a sufficient reason for denying it. That the injunction might put the infringer out of business does not justify denial of the injunction.

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JUDGES: Sue L. Robinson, District Judge.

OPINIONBY: Sue L. Robinson

OPINION:

OPINION

Dated: March 13, 1998
Wilmington, Delaware

ROBINSON, [*2] District Judge

I. INTRODUCTION

Plaintiff Ajinomoto Co., Inc. ("Ajinomoto") filed this suit pursuant to *35 U.S.C. § 271*(g) against defendant Archer-Daniels-Midland Co. ("ADM") on April 6, 1995 seeking damages (lost royalty income) and an injunction against defendant Archer-Daniels-Midland ("ADM") for alleged infringement of a patent that is directed to a method for the preparation of bacterial strains possessing enhanced capability of producing amino acids.

Specifically, Ajinomoto charges that ADM willfully infringed claims 1 and 2 of U.S. Patent No. *4,278,765* ("the *'765* patent") entitled "Method for Preparing Bacterial Strains Which Produce Amino Acids" issued on July 14, 1981. The priority patent to this patent was filed in the former Soviet Union on June 30, 1978.

Defendant denies infringement and challenges the validity and enforceability of the *'765* patent under *35 U.S.C. §§ 112* ("obviousness"), 103 ("best mode" and "enablement"), and 115 and 116 ("oath of applicant"). Specifically, ADM charges that: (1) the specification of the *'765* patent: (a) does not disclose the best mode contemplated by the inventors of carrying out their invention, (b) fails to enable the [*3] full scope of generic claims 1 and 2 without undue experimentation, and (c) lacks the deposit of the biological materials in a depository that will distribute samples of the material to members of the public who wish to practice the invention after the patent issues (§ 112); (2) the differences between the patented invention and the prior art are such that claims 1 and 2 would have been obvious to one of ordinary skill in the pertinent art (§ 103); and (3) not all of the inventors personally signed the declarations required to grant the *'765* patent (§§ 115, 116). Additionally, ADM contends that Ajinomoto lacks standing to sue ADM for infringement of the *'765* patent because the chain of title of the *'765* patent from the named inventors to Ajinomoto was not established. Moreover, ADM affirmatively defends that the *'765* patent is invalid because the patent applicants conducted themselves inequitably in their prosecution of the patent application by withholding and concealing prior art and by concealing the best mode of carrying out the invention.

The court has jurisdiction over this matter pursuant to *28 U.S.C. § 1338*(a).

The parties tried this matter to the court from October 28, [*4] 1996 through November 11, 1996. The following constitutes the court's findings of fact and conclusions of law pursuant to *Fed.R.Civ.P. 52(a)*.

II. FINDINGS OF FACT

A. The Invention

1. **Amino Acids.** The *'765* patent is directed to a method for the construction of genetically engineered bacterial strains possessing an enhanced capability of producing selected amino acids, such as threonine, without the need for additional growth factors. (Joint Exhibit ("JX") 1 at col. 3, lines 1–4) Amino acids are the building blocks of proteins. Proteins are complex macromolecules composed of long chains of amino acids that carry out structural and/or catalytic functions in cells. (D.I. 307 at 97–99) There are twenty amino acids: alanine, valine, leucine, isoleucine, proline, phenylalanine, methionine, tryptophan, glycine, asparagine, glutamine, cysteine, serine, threonine, tyrosine, aspartic acid, glutamic acid, lysine, arginine, and histidine.

2. The *'765* patent specifically discloses a method for producing an Escherichia coli ("E. coli") bacteria capable of overproducing the amino acid threonine. (JX 1) Threonine is of great industrial importance. It is an essential [*5] amino acid which, because it cannot be produced by any animal, must be supplied through dietary supplements. ADM's animal feed supplements supply various essential amino acids, including threonine.

3. A bacterial strain is a type or variety of a particular species of bacteria. There are thousands of known species of bacteria, as well as many bacterial strains within each species. All bacteria naturally make amino acids. Bacterial strains prepared in accordance with the patented technology can reduce the cost of producing amino acids, which are used, inter alia, as feedstuff and food additives in the agriculture and food industry. (JX 1 at col. 1, lines 8–12)

4. **Threonine Biosynthesis.** Threonine synthesis in a cell is a five step process. (Docket Item ("D.I.") 308 at 322–24; D.I. 313 at 941; Defendant's Exhibit ("DX") 298 at 346; DX 1005) In step 1, aspartate is converted into aspartyl phosphate. (D.I. 313 at 940–43; DX 298 at 346; DX 1005) Step 2 involves the conversion of aspartyl phosphate into aspartate semialdehyde. (D.I. 313 at 940–43; DX 298 at 346; DX 1005) The third step involves the conversion of aspartate semialdehyde into homoserine. (D.I. 313 at 940–43; DX 298 [*6] at 346; DX 1005) In step 4, homoserine is converted into O–phospho homoserine. (D.I. 313 at 940–43; DX 298 at 346; DX 1005) And finally, in step 5, O–phospho homoserine is converted into threonine. (D.I. 313 at 940–43; DX 298 at 346; DX 1005) Subsequently, some of the threonine is converted into isoleucine; the product of the ilvA gene catalyzes the first step in this transformation. (D.I. 313 at 940–43; DX 298

at 346; DX 1005) Through separate pathways, the process also results in the synthesis of lysine and methionine from the threonine precursors aspartate semialdehyde and homoserine, respectively. (D.I. 313 at 940–43; DX 298 at 346; DX 1005)

5. In E. coli n1 the entire process is catalyzed by a variety of enzymes, n2 three of which are coded by the threonine operon. n3 (D.I. 307 at 105–06; D.I. 313 at 947; DX 298 at 345; DX 1005) The threonine operon contains three structural genes: thrA, thrB, and thrC. (D.I. 307 at 105–06; D.I. 313 at 947; DX 298 at 346; DX 1005) The thrA gene codes for a bifunctional enzyme—aspartokinase for thrA[1] and homoserine dehydrogenase for thrA[2]—which catalyze steps 1 and 3, respectively. (D.I. 307 at 105–06; D.I. [*7] 313 at 940–43; DX 298 at 346; DX 1005) The two remaining genes, thrB and thrC, code for homoserine kinase (step 4) and threonine synthetase (step 5), respectively. (D.I. 307 at 105–06; D.I. 313 at 940–43 DX 298 at 346; DX 1005)

n1 The biosynthetic pathway for the production of threonine is not the same in all bacterial species. (D.I. 307 at 944–946) For example, with respect to Corynebacteria, although the basic steps in the pathway are the same, the number of isoenzymes involved in the various steps varies as does the method of regulation. (D.I. 313 at 944–46) In addition, in Corynebacteria although the thrA and asd genes are together on one part of the bacterial chromosome, the thrB and thrC are on two separate pieces of DNA. (D.I. 313 at 944–46)

n2 The first step is catalyzed by three isoenzymes, the second by one, the third by two, the fourth by one, and the fifth by one. (D.I. 313 at 941) An isoenzyme (or isozyme) is one of a group of enzymes that are very similar in catalytic properties, but can be distinguished based on variations in physical properties.

[*8]

n3 The term operon is defined as "[a] unit of genetic expression consisting of one or more related genes and the operator and promotor sequences that regulate their transcription." Albert L. Lehninger, Principles of Biochemistry 977 (Sally Anderson & June Fox eds., 1982). In the '765 patent, the term operon is defined as "a jointly controlled group of genes generally monitoring the synthesis of a single product, e.g. aminoacid." (JX 1 at col. 1, lines 49–51)

6. The product of the asd gene, n4 which is located outside of the threonine operon (approximately 1500 genes away), catalyzes the conversion of aspartyl phosphate into the semialdehyde of aspartic acid (the second step in threonine synthesis). (D.I. 313 at 947) This is not a limiting step in the biosynthetic process.

N4 Although Ajinomoto asserts that testimony regarding the role of the asd gene in the biosynthesis of threonine should be discarded because of insufficient notice, the issue was raised by Ajinomoto's expert witness, Dr. Joseph O. Falkinham III, on cross-examination when he was questioned regarding threonine synthesis in E. coli.

[*9]

7. In E. coli, regulation of the threonine operon is accomplished by means of a multivariant repression mechanism (negative feedback regulation), so that when a large amount of a particular product is formed, it blocks its own synthesis. (D.I. 313 at 942) With respect to the first step of threonine synthesis, lysine inhibits one of the isozymes, methionine inhibits a second isozyme, and isoleucine and threonine inhibit the third isozyme. (D.I. 313 at 940–43; DX 298 at 346; DX 1005) Lysine and methionine also regulate their own synthesis. (D.I. 313 at 940–43; DX 298 at 346; DX 1005) In addition, threonine and isoleucine inhibit one of the isozymes involved in step 3. (D.I. 313 at 940–43; DX 298 at 346; DX 1005) Besides the feedback inhibition effect that changes the activity of the level of the available enzyme, isoleucine and threonine also affect the level of available enzyme—as the levels of isoleucine and threonine increase, the amount of enzyme decreases. (D.I. 313 at 940–43)

8. **The Technology Developed by the Genetika Researchers.** The method of preparation set forth in the '765 patent was developed by fourteen researchers at the Institute for Genetic Engineering and [*10] Industrial Microbiology ("Genetika") in the former Soviet Union. (D.I. 307 at 123–24) In developing the process, the researchers combined skills from both classical genetics and recombinant DNA technology. (D.I. 307 at 126) Although not the first scientists to employ recombinant DNA technology, the Genetika researchers were the first in the former Soviet Union to do so. (DX 1100 at 30–31) Unlike their peers in other countries who were applying recombinant DNA technology n5 to the development of pharmaceuticals, the Genetika researchers applied this technology to the production of enzymes and, as in the case of the '765 patent, amino acids. (D.I. 307 at 124–26)

n5 Herb Boyer and Stanley Cohen of Stanford University and the University of California,

San Francisco respectively developed recombinant DNA technology. (D.I. 307 at 111) The technology was first described in a paper in The Proceedings of the National Academy of Sciences in November 1973. (D.I. 307 at 111) As compared to classical genetics, which typically involves exposing microorganisms to mutagens that randomly alter genetic material and then screening for mutants with desired characteristics, recombinant DNA technology involves the making of specific alterations in DNA, generally through the cutting and then ligating of DNA from different sources. (D.I. 307 at 111)

[*11]

9. In order to create a bacterial strain capable of overproducing threonine, the Genetika researchers used a strain of E. coli that was feedback resistant for the amino acid threonine. (JX 1 at col. 3, lines 30–36) Using recombinant DNA technology, n6 the researchers isolated the threonine operon from the strain and combined this chromosomal fragment with a plasmid. n7 (JX 1 at col. 3, lines 30–36) This hybrid plasmid was then inserted into a host bacterial strain that was auxotrophic n8 with respect to threonine and contained a partial block ("leaky auxotroph") in the related step of metabolism, the conversion of threonine to isoleucine. (JX 1 at col. 3, lines 46–51) The resultant strain of bacteria was capable of the over production of threonine.

n6 For basic background information about molecular biology and recombinant DNA technology, see *In re O'Farrell, 853 F.2d 894, 895–99 (Fed. Cir. 1988).*

n7 The term plasmid refers to "an extrachromosomal, independently replicating small circular DNA molecule." Albert L. Lehninger, Principles of Biochemistry 977 (Sally Anderson & June Fox eds., 1982).

[*12]

n8 An auxotrophic bacterial strain possesses a mutation that renders it "defective in the synthesis of a given biomolecule, which must thus be supplied for its normal growth." Principles of Biochemistry 970 (Sally Anderson & June Fox eds., 1982).

B. The *'765* Patent Application

10. **The Russian Patent Application.** On June 30, 1978, fourteen Genetika researchers n9 filed a Russian patent application entitled "Method for Preparing Strains Producing Aminoacids" (application no. 2639616) ("the Russian patent application"). (Plaintiff's Exhibit ("PX") 2) This patent was directed to "a method for preparing strains of microorganisms possessing an increased ability of producing aminoacids [sic] and lack of demands for additional growth factors." (PX 2 at 80) According to Soviet law, the Russian patent application was personally signed by all fourteen inventors. (D.I. 196 at Ex. 5, P 44)

n9 The fourteen inventors were: Vladimir G. Debabov, Jury I. Kozlov, Nelli I. Zhdanova, Evgeny M. Khurges, Nikolai K. Yankovsky, Mikhail N. Rozinov, Rustem S. Shakulov, Boris A. Rebentish, Vitaly A. Livshits, Mikhail M. Gusyatiner, Sergei V. Mashko, Vera N. Moshentseva, Ljudmila F. Kozyreva, and Raisa A. Arsatiants.

[*13]

The Russian patent application listed sixteen references, the pertinent contents of which were identified by use of reference numbers throughout the text of the specification. (PX 2 at 98) Of these references, only the following are relevant to the case at bar: (1) an article authored by several of the named co-inventors of the *'765* patent (Gusyatiner, Zhdanova, Livshit[s]; and Shakulov) entitled Investigation of the function of the relA gene in the expression of amino acid operons: Communication II. Influence of the allelic state of the relA gene on oversynthesis of threonine by a mutant of Escherichia coli K–12 resistant to beta–hydroxynorvaline appearing in the publication Genetika 14(6) (June 1978) ("Genetika II") and (2) an article entitled A Suitable Method for Construction and Molecular Cloning Hybrid Plasmids Containing EcoRI–fragments of E. coli Genome authored by Kozlov et al. (including the named co–inventors Kozlov, Rebentish, and Debabov) published in Molecular and General Genetics in 1977 ("the Kozlov article").

11. **U.S. Patent Application**. The same fourteen inventors who filed the Russian patent application filed the United States counterpart to the [*14] Russian patent application on June 28, 1979, two days before the end of the one year priority period. n10 (PX 2) The inventors claimed a priority filing date of June 30, 1978 based upon the Russian application. (PX 2) The following documents were included along with the U.S. patent application: (1) a Russian Language Declaration for Original Patent Application ("Russian Language Declaration"); (2) the original Russian patent application; and (3) an English translation of the Russian patent application. (PX 2)

n10 Title [HN1] *35 U.S.C. § 119* provides a right of priority for U.S. patent applications if an application for a patent on the same invention was

previously filed in a foreign country. Section 119 provides, in part:

> An application for patent for an invention filed in this country . . . shall have the same effect as the same application would have if filed in this country on the date on which the application for patent . . . was first filed in such foreign country, **if the application in this country is filed within twelve months** from the earliest date on which such foreign application was filed; but **no patent shall be granted on any application for patent for an invention which had been patented . . . in any country more than one year** before the date of the actual filing of the application in this country . . . .

35 U.S.C. § 119 (emphasis added).

[*15]

12. **The Inventors' Signatures** The Russian Language Declaration and the Russian patent application contain fourteen signatures purporting to be the signatures of the fourteen original inventors. (PX 2 at 48–53) With respect to the Russian Language Declaration, each signature is followed by a typed date of June 21, 1979. (PX 2 at 48–53) Dr. Juri Ivanovich Kozlov n11 testified that the signature on the Russian Language Declaration is not his own; however, the signor, who he believed to be an employee in Genetika's patent department, "had [his] permission to put [his] signature in [his] absence." (DX 1106 at 144) Dr. Kozlov further testified that he did not remember if he read the declaration or whether it was explained to him before he granted permission for someone to sign it for him. (DX 1106 at 145–46)

> n11 Only two of the original fourteen inventors were deposed in this litigation. None of the inventors testified at trial.

13. Dr. Vladimir Georgievich Debabov testified that his signature on the Russian [*16] Language Declaration is, in fact, his own. (DX 1100 at 42) Although he does not remember the date on which he signed the declaration, he believed it must have been June 21, 1979 since that is the date on the form. (DX 1100 at 42)

14. **The Prior Art References.** The U.S. patent application omitted the sixteen references found in the Russian patent application. However, unlike the Russian patent application, the U.S. patent application cited six publications which described in detail the method of in vitro preparation of hybrid DNA molecules and the introduction of these molecules into a recipient strain by means of transformation or transfection using a plasmid or bacteriophage as a vector. (JX 1 at col. 2, lines 37–44) Of these publications two are relevant to the case at bar: (1) an article authored by Clarke and Carbon entitled Biochemical Construction and Selection of Hybrid Plasmids Containing Specific Segments of the Escherichia coli Genome, which was published in Proc. Nat'l Acad. Sci. USA, Vol. 72, No. 11 in November 1975 ("the Clarke/Carbon article") and (2) the Kozlov article. (JX 1 at col. 2, lines 52–53, 56–58)

15. At the time the *'765* patent application was [*17] submitted, applicants were encouraged to file a prior art statement listing therein, "in the opinion of the person filing[,] . . . the closest prior art of which that person is aware." *37 C.F.R. § 1.97(a)*-(b) (1978). Said statement was "not to be construed as a representation that a search had been made or that no better art existed." *37 C.F.R. § 1.97(b)*. The statement was to be accompanied by a copy of each listed patent or publication. *37 C.F.R. § 1.98(a)*. A prior art statement was not submitted as part of the *'765* patent application.

According to ADM's expert in Patent and Trademark Office ("PTO") procedure, Mr. Van Horn, at the time of the invention, a PTO Examiner was not likely to review publications that were merely mentioned in the patent application. (D.I. 316 at 1420) Moreover, he testified that unless circumstances arose that necessitated an Examiner to review a priority patent application (e.g., a challenge to the priority date), the content of a priority patent was not reviewed as part of a normal examination of a patent application. (D.I. 316 at 1427–28; DX 268 at 28) If an applicant wanted to be assured that the Examiner considered certain information, he could [*18] submit copies of publications or other information to the PTO. (D.I. 316 at 1421) Mr. Van Horn also testified that there were two ways for an Examiner to indicate that a particular reference had been considered: (1) citing the documents in the patent application or (2) placing his initials next to the citation with an indication that it had been checked. (D.I. 316 at 1423–24) The record indicates that neither method was employed with respect to the *'765* patent.

16. The American attorneys who prosecuted the *'765* patent did not recall providing the PTO Examiner with copies of Genetika II, the Clarke/Carbon article, or the Kozlov article. (DX 1101 at 44–45; DX 1119 at 28, 32–33) The attorneys testified that their standard procedure with respect to patent applications filed on behalf of Genetika was to check the application for compliance with PTO

guidelines and to submit the application basically as is, i.e., without supplementation. (DX 1101 at 40–44; DX 1107 at 28–29, 49–52; DX 1119 at 45–49) It is undisputed that the applicants had knowledge of the existence of the aforementioned articles. It is also undisputed that the Clarke/Carbon article and the Kozlov article are material. [*19]

17. **U.S. Patent Prosecution History**. On January 21, 1980, during the prosecution of the *'765* patent application, the PTO Examiner rejected claims 1–4 as not enabled under *35 U.S.C. § 112*. (PX 2 at 100) In an Office Action dated January 21, 1980, the Examiner cited the following reasons for his rejection of the claims:

> (1) Applicants failed to comply with requirements (1) and (3) of MPEP 608.01(p) Deposit of Microorganisms n12 regarding the parent E. coli strains and the newly produced E. coli strains. n13
>
> (2) Claims are improper process claims in failing to affirmatively recite steps.
>
> (3) The disclosure is not enabling to support the breadth of the terms "vector DNA molecule." Only plasmids appear to be suitable and operative as the vector.

(PX 2 at 100) The Examiner went on to state that "the listed references [were] considered to be pertinent to the claimed invention, but the claims are deemed patentable thereover." n14

> n12 At the time the application for the *'765* patent was pending, § 608.01(p) of the Manual of Patent Examining Procedure ("MPEP") provided as follows:
>
> > Some inventions which are the subject of patent applications depend on the use of microorganisms which must be described in the specification in accordance with *35 U.S.C. 112*. No problem exists when the microorganisms used are known and readily available to the public. When the invention depends on the use of a microorganism which is not so known and readily available, applicants must take additional steps to comply with the requirements of Section 112.
>
> In the latter circumstances, the MPEP required applicants to make "a deposit of a culture of the microorganism in a depository affording permanence of the deposit and ready accessibility thereto by the public if a patent is granted. . . ." The section further provided that "all restrictions on the availability to the public of the culture so deposited will be irrevocably removed upon the granting of the patent." (D.I. 64, Ex C)

[*20]

> n13 According to the specification, two of the strains, VL334(pYN6) and VL334 (pYN7) having registration numbers CMIM B–1649 and CMIM B–1684, respectively, already were deposited in the Central Museum of Industrial Microorganisms of the All–Union Research Institute of Industrial Microorganisms ("the Central Museum") at the time the application was filed. (PX 2 at 21–22)
>
> n14 Two references were cited on Form PTP–892, Notice of References Cited: Sinsheimer, Ann. Rev. Biochem 46, 415–438, 1977 and Itokura et al., Science vol. 98, pp. 1056–1063. (PX 2 at 101) A copy of the Sinsheimer reference was included in the file wrapper. (PX 2 at 142–164)

18. In May 1980, in response to the Examiner's rejection, the one of the applicants' attorneys, Charles Rodman, agreed to "attempt to rectify depository deficiencies" by "furnishing a new declaration containing the required information." (PX 2 at 103, 119) In addition, Mr. Rodman agreed to "amend [the] claims extensively to eliminate [§] 112 rejections." (PX 2 at 103)

19. On May 21, 1980, Mr. Rodman filed a response to the Office Action [*21] requesting reconsideration of the application and entry of numerous amendments, consisting mainly of editorial and typographical corrections in accordance with the PTO action. (PX 2 at 119) He also added the following to the patent application: "The parent strains of VNIIGenetika MG442 and VNIIGenetika VL334 are also deposited in the aforesaid Central Museum and are identified by the registration numbers CMIM B–1641 and CMIM B–1628, respectively." Mr. Rodman stated that he was in the "process of obtaining a Supplementary Declaration from the inventors containing the depository identification of the parent strains and the product strains." He added that he "considered the references cited by the Examiner to show the state of the art, however, inasmuch as these references have not been cited against the claims, and do not appear relevant thereto, a detailed discussion of them shall not appear herein." (PX 2 at 121) A supplemental response to

the January 21, 1980 Office Action was filed in August 1980. (PX 2 at 122-24)

20. On August 25, 1980, Mr. Rodman filed the Supplemental Combined Declaration and Power of Attorney ("Supplemental Declaration of 1980") (PX 2 at 125-129) with the PTO, [*22] representing under penalty of perjury that,

> no later than the effective U.S. filing date of the application, [they had] made a deposit of a culture of the microorganism in a depository affording permanence of the deposit and ready accessibility thereto by the public if a patent is granted, under conditions which assure (a) that access to the culture will be available during pendency of the patent application to one determined by the Commissioner to be entitled thereto under *37 C.F.R. 1.14* and *35 U.S.C. § 122*, and (b) that all restrictions on the availability to the public of the culture so deposited will be irrevocably removed upon the granting of the patent.
>
> This deposit is identified by: Deposit number CMIM B-1628, CMIM B-1641, CMIM B-1649, CMIM B-1684.
>
> Name and address of the depository: Central Museum of Industrial Microorganisms of the All-Union Research Institute of Genetics and Selection of Industrial Microorganisms, USSR, Moscow 113545, Dorozhnaya S.
>
> Taxonomic description (if available): Escherichia coli K-12.

(PX 2 at 126) The donor strain (MG442) was registered as CMIM B-1628; the recipient strain (VL334) was registered as CMIM B-1641; the [*23] product of claim 3 (VL334(pYN6)) was registered as CMIM B-1649; and the product of claim 4 (VL334(pYN7)) was registered as CMIM B-1684. (PX 2 at 126) The filing of the Supplemental Declaration of 1980 overcame the Examiner's § 112 rejection of the claims by representing that the strains had been deposited.

21. **The Inventors' Signatures**. The Supplemental Declaration of 1980 contains fourteen signatures, all dated July 17, 1980, that purport to be the signatures of the fourteen original inventors. (PX 2 at 127-29) However, Dr. Kozlov testified that the Kozlov signature is not his own, and that he was unaware of who signed. (DX 1106 at 146-47) Nevertheless, Kozlov testified that he knew of and authorized the signing of his name to the Supplemental Declaration of 1980 but that he was unsure of the date of the signing. (DX 1106 at 146-47) The Kozlov signature on the Supplemental Declaration is consistent in appearance with the Kozlov signature on the Russian Language Declaration. (D.I. 314 at 1256, 1258-59; DX 149; DX 390; DX 1106 at 1104) Dr. Kozlov further testified that he did not remember if he read the Supplemental Declaration of 1980 or if it was explained to him before he [*24] authorized someone to sign for him. (DX 1106 at 145-46)

Dr. Debabov testified that he personally signed the Supplemental Declaration of 1980 but that someone else wrote the date next to his signature. (DX 1100 at 44-45) Dr. Debabov further testified that he did not read the Supplemental Declaration of 1980 because it was explained to him by someone in the patent department. (DX 1100 at 115-17)

22. The PTO Examiner subsequently issued a Notice of Allowance (PX 2 at 133) and the *'765* patent issued on July 14, 1981.

23. In order to rectify the signature discrepancies, on August 5, 1996, Ajinomoto filed with the PTO a Supplemental Declaration ("Supplemental Declaration of 1996") that contains the true signatures, according to counsel for Genetika, Mr. Mtibelishvili, of the fourteen inventors along with a petition to the Commissioner of Patents and Trademarks pursuant to *37 C.F.R. §§ 1.67* and *1.182* requesting that the PTO place the Supplemental Declaration of 1996 in the file wrapper. (PX 900) Ajinomoto claimed that the filing containing the authorized signatures "was the result of a lack of knowledge of the technical requirements of U.S. patent law and was made without any deceptive [*25] intent." (PX 900)

24. ADM' expert witness, Mr. Lyndal L. Shaneyfelt, a retired FBI document examiner, compared the fourteen signatures on the Russian Language Declaration to the fourteen signatures on the Supplemental Declaration of 1980 and found that six (and possibly seven) of the signatures were not written by the same person. (D.I. 314 at 1247) However, Mr. Shaneyfelt conceded that the signatures were difficult to compare since those on the Russian Language Declaration were written using the Russian alphabet, whereas those on the Supplemental Declaration of 1980 were written using the Arabic alphabet. (D.I. 314 at 1246) Mr. Shaneyfelt also testified that a comparison of the English signatures on the Supplemental Declaration of 1980 revealed numerous significant writing features in common. (D.I. 314 at 1248-50) He concluded that the at least three, and possibly five, of the signatures were written by the person who made the Debabov signature. (D.I. 314 at 1252) However, he found the examination problematic because there were not "a lot of the same letters." (D.I. 314 at 1251)

Mr. Shaneyfelt also testified that the Kozlov signature on the Russian Language Declaration (DX 390) [*26] was "generally consistent" with the exemplar (DX 149) that was done at Dr. Kozlov's deposition in the summer of 1996. (D.I. 314 at 1258) In addition, Mr. Shaneyfelt testified that, after comparing the Kozlov signatures on the Russian Language Declaration and the Supplemental Declaration of 1980 with the Kozlov signature on the Supplemental Declaration of 1996, he was "not able to make [a] determination" that the Kozlov signature was or was not Mr. Kozlov's personal signature because there were "too many inconsistencies." (D.I. 314 at 1258)

According to Mr. Van Horn, if a foreign company owns the patent application, it is appropriate for a representative of the company to sign the declaration as representative of the owner of the application if he has authority and that authority is clearly indicated. (D.I. 316 at 1454) Thus, there is no requirement that the inventors personally sign the declaration. (D.I. 316 at 1454)

C. The *'765* Patent

25. The abstract described the invention claimed in the *'765* patent as follows:

> A method for constructing strains which produce aminoacids [sic] comprising combining of a DNA chromosome fragment of a donor microorganism containing [*27] genes controlling the synthesis of a selected aminoacid and having a mutation destroying the negative regulation of the synthesis of this aminoacid with a vector DNA molecule to form a hybrid DNA molecule. Use is made of a vector DNA molecule capable of providing amplification of the hybrid DNA molecule. The resulting hybrid DNA molecule is used for transforming cells of the recipient strain having the mutation blocking the synthesis of the selected aminoacid in this strain and the mutation partly blocking the related step of metabolism of this aminoacid to yield the strain capable of increased productivity of the selected aminoacid.

(JX 1 at 1)

26. The specification included the following object of the invention claimed:

> to use genetic engineering techniques to prepare strains which produce aminoacids [sic] possessing enhanced capability of producing aminoacids without additional growth factors.

(JX 1 at col.3, lines 1–4)

27. The *'765* patent contains five claims. Claims 1 and 2 are generic claims, drawn to a method of producing a microorganism capable of producing any amino acid. Claims 3 and 4 are specifically drawn to methods of producing strains capable [*28] of producing threonine. Claim 1 is the only independent claim; claims 2–4 depend on claim 1. Only claims 1 and 2 are in dispute in this case.

28. Claim 1 reads:

> 1. A method for preparing bacterial strains which produce aminoacids [sic] comprising combining a chromosome DNA fragment of a donor bacterium containing genes controlling the synthesis of a selected aminoacid and having a mutation which destroys the negative regulation of the synthesis of said aminoacid, with a plasmid DNA molecule capable of ensuring amplification, to form a hybrid DNA molecule; transforming with said hybrid DNA molecule, cells of a recipient bacterial strain having a mutation blocking the synthesis of the selected aminoacid in said strain and a mutation partly blocking the related step of metabolism of said aminoacid, to yield a bacterial strain possessing increased productivity of the selected aminoacid.

(JX 1 at col.12, lines 2–15)

29. Claim 2 provides:

> 2. A method as claimed in claim 1, wherein for the removal of ballast genetic material, the hybrid DNA molecule is treated, prior to transforming cells of the recipient strain, with specific endonucleases ensuring cleavage of [*29] the hybrid molecule of DNA in predetermined sites of the molecule, followed by recombination and joining of the required DNA fragments with polynucleotide ligase.

(JX 1 at col.12, lines 16–23)

30. Claim 1 of the *'765* patent sets forth the steps for producing genetically engineered bacterial strains which produce amino acids. It teaches a two-step process of combining and transforming. First, a chromosome DNA fragment of a donor bacterial strain is combined with a plasmid DNA molecule capable of ensuring amplification

to form a hybrid DNA molecule. The piece of chromosomal DNA from the donor bacterial strain, which is part of the hybrid DNA molecule, has two characteristics: (1) it contains the instruction (or genes) for the production of the selected amino acid and (2) it has a mutation blocking the negative regulation of the synthesis of the amino acid (i.e., feedback inhibition resistance has been destroyed). n15 Second, this hybrid DNA molecule is then transformed (or inserted) into a recipient bacterial strain. The recipient bacterial strain must have: (1) a mutation blocking the synthesis of the selected amino acid; and (2) a mutation partly blocking a related step of [*30] the metabolism of the selected amino acid. The resulting combination of the hybrid DNA molecule and the recipient bacterial strain has increased production capability of the selected amino acid. The process taught in claim 1 utilizes three major components: (1) a chromosome DNA fragment from a donor bacterial strain; (2) a plasmid DNA molecule; and (3) host cells as the DNA recipient.

n15 The patent specification first described several experiments using E. coli in which the inventors used an unmutated donor chromosome DNA molecule in combination with a plasmid to form a hybrid DNA molecule. (JX 1 at col. 6, lines 4-22) In these experiments, threonine production did not increase. The specification then set forth Examples 1 and 2, describing the use of a mutated donor chromosome DNA molecule in combination with a plasmid to form a hybrid DNA molecule where threonine production increased. (JX 1 at col. 8, line 45 through col. 10, line 53) In Example 3, the amount of threonine formed by the E. coli strains of Examples 1 and 2 is measured. (JX 1 at col. 10, line 55 through col. 11, line 68)

[*31]

31. Claim 2 depends from claim 1 and therefore includes all its limitations. It is directed to a method for removing ballast genetic material from the hybrid DNA molecule before its insertion into the recipient strain. Ballast genetic material is unneeded, unwanted DNA. (D.I. 307 at 166; D.I. 313 at 967) In the method of claim 2, prior to transformation, the hybrid DNA molecule is treated with specific endonucleases (restriction enzymes) at predetermined sites (restriction sites) to provide a mixture of DNA fragments, after which the DNA fragments are recombined (ligated) using the enzyme polynucleotide ligase.

D. The Prior Art

32. The publications characterized by ADM as prior art include: (1) a doctoral thesis authored by David Tribe in December 1976 entitled Tryptophan Production by Escherichia coli: A Feasibility Study, ("the Tribe thesis") (DX 383); (2) the Kozlov article (DX 321); (3) two articles n16 authored by several of the named co-inventors of the *'765* patent (Livshits, Shakulov, Gusyatiner, and Zhdanova) appearing in the publication Genetica 14(6) (June 1978) (collectively the "Genetica articles") (DX 305; DX 326); and (4) the Clarke/Carbon article (DX 290). [*32] All of these references are within the field of microbial genetics.

n16 The articles are entitled, respectively, Investigation of the Allelic State of the relA Gene on the Phenotypic Expression of Mutations of Threonine and Isoleucine Auxotrophy: Communication I. Influence of the allelic state of the relA gene on Phenotypic expression of mutations of threonine and isoleucine auxotrophy in Escherichia coli K-12 ("Genetika I"); and Investigation of the function of the relA gene in the expression of amino acid operons: Communication II. Influence of the allelic state of the relA gene on oversynthesis of threonine by a mutant of Escherichia coli K-12 resistant to beta-hydroxynorvaline ("Genetika II").

It is undisputed that none of the prior art publications, standing alone, anticipates the teachings of the *'765* patent.

33. **The Tribe Thesis: Availability.** ADM relies entirely upon the testimony of Dr. Tribe to establish the availability of the Tribe thesis. According to Dr. Tribe, who received his Ph.D. [*33] degree from the University of Melbourne in July 1977, each of the following were sent a copy of his thesis around May 1977: (1) the Baillieu Library at the University of Melbourne; (2) the Heather Jenkins Research Library of the University of Melbourne Department of Microbiology; (3) Professor H.A. Pittard at the University of Melbourne; and (4) Professor Arnold Demane at the Massachusetts Institute of Technology. (D.I. 314 at 1200) Dr. Tribe testified, based on his personal knowledge, that in 1977 both of the libraries had a card catalogue system and were open to the public. (D.I. 314 at 1201-04)

34. At trial, Dr. Tribe had with him a bound copy of his thesis bearing a date stamped by the Heather Jenkins Research Library of October 28, 1977, a copy of which was submitted into evidence. (DX 383) This date-stamped copy was not provided to Ajinomoto during discovery. (D.I. 314 at 1193) According to Dr. Tribe, this date-stamp reflects when the thesis was received, catalogued, and shelved by the Heather Jenkins Research

Library. (D.I. 314 at 1200–02) Dr. Tribe testified that his thesis presently is listed in the card catalogue system at the Heather Jenkins Research Library and that he [*34] had no reason to believe that his thesis was not accessible to members of the public prior to June 1978. (D.I. 314 at 1200–03)

35. With respect to the copy of the Tribe thesis located in the Baillieu Library, Dr. Tribe testified that he believed his thesis to be listed in the card catalogue system although he had "not directly examined the card index system." (D.I. 314 at 1204) Nevertheless, he stated that he "physically [has] looked at [his] thesis in the [Baillieu] Library." (D.I. 314 at 1205) According to Dr. Tribe, it was his understanding that it takes approximately six months for the Baillieu Library to place items it receives, such as his dissertation, on the shelves. (D.I. 314 at 1205) Dr. Tribe testified that it was his belief that his thesis was placed in the Baillieu Library card catalogue system and was accessible to the public prior to June 1978. (D.I. 314 at 1205–07)

36. However, on cross-examination Dr. Tribe admitted that he was not at the University of Melbourne for most of 1977 and 1978 and that, therefore, there were "many details of the cataloguing with which [he] would not be familiar." (D.I. 314 at 1230)

37. Dr. Tribe also testified that he presented [*35] publicly his research findings in the United States on three different occasions prior to June 30, 1978. The first was at the Third Genetics of Industrial Microorganisms Conference, which was held in Madison, Wisconsin in early June 1978. (D.I. 314 at 1214–15) This conference was attended by approximately thirty to forty people. (D.I. 314 at 1214–15) According to Dr. Tribe, the presentation covered "getting bacteria [] to make large amounts of tryptophan." (D.I. 314 at 1215) Dr. Tribe noted that a speaker from Genetika was present at this conference. (D.I. 314 at 1216) Dr. Tribe's second presentation of his findings was at CPC International in Argo, Illinois, also in June 1978. (D.I. 314 at 1216–17) This presentation was attended by approximately 20 industrial workers and covered "getting bacteria by genetic manipulation to make large amounts of tryptophan." (D.I. 314 at 1216–17) The third presentation was in late June 1978 (but before June 30) at the University of Rochester to a group of graduate students and faculty. (D.I. 314 at 1217–18) According to Dr. Tribe, the presentation covered that part of his thesis dealing with "getting bacteria to manufacture tryptophan." (D.I. 314 [*36] at 1217–18)

38. According to Dr. Tribe, other presentations of research covered by his doctoral thesis include: (1) the First Australian Biotechnology Conference in Sydney, Australia in 1975 (an oral presentation of a "substantial portion of [his] findings in how to get bacteria to make large amounts of tryptophan"); (2) a paper presented at the Australian Biochemical Society meeting in May 1975 and published in abstract form in the Proceedings of the Australian Biochemical Society (reporting the "first half of [the] major findings in [his] thesis"); and (3) a paper published in the Journal of Bacteriology in 1976 (covering the "major section of the results . . . in [his] thesis and reporting them in considerable detail"). (D.I. 314 at 1211–1212)

39. **The Teachings of the Tribe Thesis.** The Tribe thesis discusses the combining of a chromosome DNA fragment (JP2278) containing genes controlling the synthesis of an amino acid (tryptophan), having a mutation (trpE382) that destroys the negative regulation of tryptophan, with a plasmid (F'123) as set forth in claim 1 of the *'765* patent. (D.I. 313 at 1016) In contrast to the *'765* patent, which called for the use of a plasmid [*37] capable of ensuring amplification, the F' plasmid employed by Tribe is a stringent plasmid, which is present in the cell in one or at most two copies. n17 (D.I. 314 at 1104; D.I. 316 at 1522, 1528; D.I. 317 at 1654–60) This type of plasmid, although it can be isolated as an independent entity from the cell, cannot replicate independently from the cell; it only replicates in synchrony with the chromosome. n18 (D.I. 316 at 1522) Moreover, whereas the *'765* patent teaches in vitro techniques of molecular recombination for producing a hybrid plasmid, the hybrid plasmid in the Tribe thesis is formed using in vivo recombination/transduction. (D.I. 314 at 1105–06; D.I. 316 at 1528–29; D.I. 317 at 1661)

n17 In asserting that the F' plasmid used by Dr. Tribe was capable of amplification, ADM relies on a statement appearing in a textbook on bacterial genetics that "in a rapidly growing cell, the number of F prime plasmids must, of course, be larger than two to allow for the shorter time between cell divisions." (D.I. 316 at 1558–1559; D.I. 317 at 1627) When questioned regarding this assertion, Dr. Falkinham explained that replication of F' plasmids is initiated with that of the chromosome but because of their smaller size (5% of the chromosome) their replication takes a shorter period of time. (D.I. 316 at 1559) Thus, according to Dr. Falkinham, one would expect to find between one and two copies of F' plasmids per chromosome equivalent in a rapidly growing cell. (D.I. 316 at 1559)

[*38]

n18 Dr. Tribe did recognize that manipulating

the number of copies of the plasmid might further improve tryptophan yield. (D.I. 383 at 177) In his summary, Dr. Tribe stated that "increases in tryptophan yield were obtained by amplification of . . . tryptophan enzyme levels through introduction of extra plasmid borne copies of trp genes." (D.I. 383 at iii) In addition, he recognized that work was underway "towards obtaining mutants of the multi-copy plasmid ColE1'-trp . . . in which the anthranilate synthase encoded by the [plasmid's] trp genes is feedback resistant," but that there were problems with this approach. (D.I. 383 at 144)

40. Tribe also teaches the insertion of a hybrid plasmid into a recipient bacterial strain that has a mutation ([DELTA] trpE5) completely blocking the synthesis of the selected amino acid. In contrast to the *'765* patent, which employed transformation in this step, the hybrid F' plasmid used by Tribe entered the recipient bacterial cell via conjugation (the F'521 plasmid being too large for transformation). (D.I. 307 at 113; D.I. 308 at 321-22; D.I. [*39] 313 at 1013-16, 1019; D.I. 316 at 1561; D.I. 317 at 1662) Conjugation is a natural "mating" process involving cell-to-cell contact between the donor and the recipient E. coli cells and the transfer of genetic material, in this case the plasmid. (D.I. 316 at 1016) In contrast to conjugation, transformation, as defined in the *'765* patent, involves the "transfer of genetic bacterial material to a bacterial cell by means of isolated DNA." (JX 1 at col. 1, lines 19-20)

41. Tribe employed an auxotrophic host strain for the same purpose as did the *'765* inventors: to make it easier to select bacterial strains containing the hybrid plasmid carrying the genes for the synthesis of the selected amino acid. (D.I. 314 at 1102; D.I. 317 at 1653-54; JX 1 at col. 5, lines 43-47) Tribe does not teach the use of an auxotrophic host for the over expression of tryptophan; rather Tribe affirmatively stated that one should use a non-auxotrophic host, because it would increase gene number. (D.I. 316 at 1523; D.I. 317 at 1654; D.I. 314 at 1102; D.I. 316 at 1523) Nowhere in the Tribe thesis is it suggested that an auxotrophic host be used in the over production of the selected amino acid. (D.I. 314 at [*40] 1102)

42. Tribe does not teach the use of a mutation partly blocking the related step of metabolism of the selected amino acid. Rather, the tryptophanase auxotrophy disclosed in the Tribe thesis is a complete block. (D.I. 316 at 1522; D.I. 317 at 1658) In fact, according to Dr. Frederick B. Rudolph (ADM's expert witness), Tribe stressed that a complete block was desired because metabolism of the amino acid was to be avoided. (D.I. 314 at 1109; D.I. 317 at 1658)

43. Tribe does teach the use of a recipient strain carrying a trpS378 mutation. The trpS378 mutation is a temperature sensitive mutation, n19 the phenotypic expression of which appears at temperatures greater than 37 degrees Celsius. (D.I. 316 at 1528) According to Dr. Rudolph, the benefit of the trpS378 mutation is that at higher temperatures (42 degrees Celsius or higher) the enzymatic activity of the product of the trpS378 gene decreases, thereby increasing the level of tryptophanol-tRNA which lowers the level of repression of the tryptophan operon. n20 (D.I. 317 at 1621-23, 1657) Derepression of the tryptophan operon has the effect of increasing tryptophan pathway enzyme levels, ultimately resulting in [*41] an increase in tryptophan production. (D.I. 317 at 1621-23, 1657) Although Dr. Rudolph initially stated that the trpS378 mutation was a mutation partially blocking the related step of metabolism of tryptophan (D.I. 313 at 1018-19), on rebuttal cross-examination he indicated that such was not really the case, but that the mutation was "very analogous to the isoleucine part in that the isoleucine does exactly the same thing." (D.I. 317 at 1657-58) He went on to state that Dr. Tribe's focus on the trpS378 mutation was not for its role in blocking a related step in metabolism, but for its role in derepressing the tryptophan operon. (D.I. 317 at 1658)

n19 A temperature sensitive mutation is one whose enzymatic activity is affected by the temperature. (D.I. 317 at 1621-23)

n20 According to Dr. Falkinham, E. coli were normally grown at 37 degrees Celsius. (D.I. 316 at 1527) Dr. Falkinham also testified that one would not grow E. coli at 42 degrees Celsius for commercial production because at higher temperatures bacteria stop growing and proteins denature. (D.I. 316 at 1526-27)

[*42]

44. Dr. Rudolph ultimately conceded that not a single strain constructed by Dr. Tribe had all the characteristics set forth in claim 1 of the *'765* patent. (D.I. 317 at 1653) And as indicated in a letter dated February 6, 1990 from ADM's George Stauffer to John Reed, then ADM's Vice President of International, following their meeting with Genetika, both of the characteristics of the recipient strain set forth in claim 1 (i.e., a mutation blocking the synthesis of the selected amino acid and a mutation partly blocking the related step of metabolism of the amino acid) are "important advantage[s]" of the Genetika strains. (JX 12)

45. **The Kozlov Article: Availability.** It is undisputed that the Kozlov article, which was authored by several of the *'765* inventors, is prior art. (DX 321) This article was

referenced in the specification of the '765 patent. (JX 1 at col. 1, lines 55–58). A copy of this publication was not provided to the PTO by the inventors during the prosecution of the patent.

46. **The Teachings of the Kozlov Article.** The Kozlov article teaches a method for the isolation of specific chromosomal markers whereby, using in vitro techniques, a chromosomal DNA [*43] fragment containing some of the genes necessary for amino acid production n21 is ligated with amplifiable plasmid DNA forming a hybrid plasmid that is used to transform an auxotrophic host strain.

n21 Because Kozlov used the endonuclease EcoRI in the digestion of the chromosomal DNA, the chromosomal threonine marker which resulted contained only functional thrA and thrB genes rather than the complete threonine operon. (D.I. 316 at 1520–21) This incomplete threonine operon was not feedback resistant. (D.I. 316 at 1521) However, had Kozlov used the restriction enzyme HindIII, he would have isolated a chromosome DNA fragment containing thrA, thrB, and thrC genes, i.e., the complete threonine operon. (D.I. 316 at 1563) The '765 patent disclosed the use of HindIII to digest chromosomal DNA although the '765 inventors were not the first to do so. (D.I. 316 at 1564)

47. With respect to claim 1, the Kozlov article does not teach: (1) the creation of a bacterial strain capable of over production of [*44] a selected amino acid; (2) the use of a chromosomal DNA fragment containing "the genes controlling the synthesis of a selected amino acid"; (3) the use of a chromosomal DNA fragment having a mutation making it feedback resistant; and (4) a recipient strain having a mutation partly blocking the related step of metabolism of the selected amino acid. (D.I. 316 at 1519–22; D.I. 317 at 1649–50)

48. **Genetika I & II:** n22 **Availability.** The court has previously concluded in its decision of October 21, 1996 that the Genetika articles were prior art, finding that there existed sufficient indicia of their availability. n23 (D.I. 272 at 45) Copies of these articles were not submitted to the PTO during the prosecution of the '765 patent. However, Genetika II was listed in the reference section and cited to in the specification of the Russian priority patent, a certified English translation of which was provided to the PTO as part of the U.S. patent application. (PX 2)

n22 Dr. Rudolph, in his expert report, treated the two Genetika articles as equivalent and thus cumulative of each other. (D.I. 201, Ex. Q at P 15) Therefore, the citation to one or the other is sufficient. See *Halliburton co. v. Schlumberger Technology Corp., 925 F.2d 1435, 1440 (Fed. Cir. 1991).*

[*45]

n23 Ajinomoto contests the court's holding of the prior art status of the Genetika articles, arguing that the court mistakenly relied upon incomplete information in reaching its conclusion that the references, which are cited in the Russian priority patent, were publicly available. (D.I. 323 at 49) The "complete" information referred to by Ajinomoto includes two copies of the articles bearing U.S. library date stamps of September 1978 and Dr. Debabov's deposition testimony that the inventors knew of the citations prior to publication and included them in the patent application even though the articles were not publicly available. (D.I. 323 at 49–50)

49. **The Teachings of the Genetika Articles.** The Genetika articles describe the relevance of the allelic state of the relA gene to the over synthesis of threonine. These publications also describe the donor and recipient E. coli strains used in the examples of the '765 patent. Both Genetika I and II describe the strain MG442, the donor strain in the '765 patent, as containing the genes controlling threonine production, having a mutation [*46] (thrA442) destroying the negative feedback regulation of threonine synthesis, and having a mutation (ilvA) partly blocking a related step of threonine metabolism. (D.I. 313 at 1023–25; D.I. 317 at 1632–1636; DX 305 at 671; DX 326 at 664) In addition, Genetika I describes the strain VL334, the recipient strain in the '765 patent, as having a mutation (thrC1010) blocking the synthesis of threonine and a mutation (ilvA442) partly blocking a related step in the metabolism of threonine. (D.I. 313 at 1023–25; D.I. 317 at 1632–1636; DX 326 at 661, 664) Genetika II teaches that the two mutations found in MG442—a mutation destroying feedback resistance (thrA442) and a mutation partly blocking the related step of metabolism (ilvA)—positively contribute to threonine over production. (DX 305 at 675)

50. Genetika I and II do not teach or suggest the claimed invention. As admitted by Dr. Rudolph on cross-examination, neither Genetika I nor Genetika II mention or suggest the use of plasmids or the construction of plasmids, much less the formation of hybrid plasmids. (D.I. 317 at 1640–41) In addition, neither publication discusses the isolation or increase in copy number [*47] of a feedback resistant operon or the use of an auxotrophic host

for the production of threonine.(D.I. 316 at 1518)

51. **The Clarke/Carbon Article: Availability.** The Clarke/Carbon Article was published in November 1975 and was referenced in the specification of the *'765* patent, although a copy of the article was not provided to the PTO during the prosecution of the *'765* patent. (JX 1 at col. 1, lines 52–53)

52. **The Teachings of the Clarke/Carbon Article.** The Clarke/Carbon article discusses a method using in vitro techniques for the isolation of specific segments of the E. coli genome similar to that set forth in the Kozlov article. The article teaches the digestion of plasmids and E. coli DNA with an endonuclease, followed by treatment with an exonuclease and then attachment of "connectors." (DX 290 at 4362) The mixture of annealed, but not ligated, hybrid DNA was used to transform E. coli auxotrophs, followed by selection for a specific chromosomal marker. (DX 290 at 4352) The isolated bacterial strains contained hybrid plasmids carrying either the entire tryptophan or the arabinose and leucine operons. (DX 290 at 4364) According to Clarke/Carbon, the [*48] bacterial strains containing the hybrid plasmids carrying the tryptophan operon produced elevated levels of trp-mRNA. (DX 209 at 4364) However, increased levels of tryptophan production were not reported.

53. With respect to claim 2, the last paragraph of the discussion section of the Clarke/Carbon article mentions, as one of the advantages in having gene systems isolated and cloned on plasmids carried by bacteria, that

> hybrid plasmids containing specific E. coli genes may be easily manipulated or made smaller by shearing or endonuclease digestion. New vectors can then be isolated which bear known E. coli gene systems that may be useful in the isolation and cloning of genes from other organisms. Thus, the insertion of foreign DNA into an E. coli operon, bringing the expression of that DNA under control of bacterial regulatory sequences, should be readily achieved.

(DX 290 at 4365; D.I. 313 at 1023) According to Dr. Rudolph, the Clarke/Carbon article, by stating that hybrid plasmids can be made smaller by endonuclease digestion, rendered the ballast removal step of claim 2 of the *'765* patent obvious. (D.I. 313 at 1022–23)

E. The Scope of the *'765* Patent [*49]

54. Claims 1 and 2 of the *'765* patent are generic claims directed to a method of constructing a microorganism capable of producing any amino acid.

55. At the time of the invention, approximately 50,000 different bacterial species were thought to exist, of which approximately 4000 had been identified. (D.I. 314 at 1178–80) There are twenty amino acids. (D.I. 307 at 105; D.I. 313 at 959) Thus, in theory, the process of claims 1 and 2 of the *'765* patent covers at least 1 million possible different combinations of bacterial species and amino acids.

56. The specification of the *'765* patent sets forth specific methods for preparing a single strain of E. coli bacteria capable of overproducing the amino acid threonine. (JX 1)

57. Prior to becoming the assignee of the *'765* patent, Ajinomoto argued, during the prosecution of seven patent applications, that the specification of the *'765* patent did not enable the full scope of the claims. (PX 218; PX 219; PX 221; PX 222; PX 223; PX 224; PX 225) However, in each instance, the PTO Examiner rejected Ajinomoto's argument, finding that the patent was enabled since the types of mutations suggested by the patent were conventional and one skilled [*50] in the art could easily produce such mutants because genetic engineering techniques were conventional and well-known. (PX 218 at 98–101, 128, 219–221; PX 219 at 119–20; PX 221 at 65–6; PX 222 at 139; PX 223 at 89–90; PX 224 at 106–07; PX 225 at 106–07) In particular, various PTO Examiners stated at various times:

> One skilled in the art could practice the invention using as the DNA donor any microorganism having a mutation in the negative regulation of the synthesis of the amino acid and as the recipient a microorganism which has a mutation partly blocking a related step of the metabolism of the amino acid. No particular organisms are required as evidenced by claims 1 and 2 of [the *'765* [patent] which are not restricted to any microorganisms. **The types of mutations suggested by [the *'765* patent] are conventional and have been used repeatedly to cause microorganisms to produce more amino acid product. The literature is replete with microorganisms which could be used.** [The *'765* patent's] contribution was using genetic engineering to produce another microorganism.

(PX 218 at 220) (emphasis added).

> **The methods taught by [the *'765* patent] are predictable** [*51] **and can be prac-**

ticed with starting materials cited in the patent, or their well-known equivalents, all available to one of ordinary skill in the art.

> . . . When a case involves starting materials which are already known and available to persons in the art at the time of filing an application for patent, the description need not contain an enabling disclosure of them . . .
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(PX 223 at 88) (alteration in original) (emphasis added).

> [The *'765* patent] provides an adequate disclosure for one skilled in the art to practice the invention whether or not the microorganism is available . . . . In order to practice the invention of [the *'765* patent] to make any amino acid, one skilled in the art could use any mutant which has the characteristics disclosed by the patent and successfully produce amino acids.

(PX 222 at 139) (emphasis added).

> **Such mutant strains for a particular amino acid are well known in the art and their use would be obvious.** Moreover, the broad claims are not restricted to any particular strains.
>
> * * *
>
> [The *'765* patent] **provides an adequate teaching to one** [*52] **skilled in the art to produce any amino acid from available mutants.**

(PX 224 at 105-07) (emphasis added).

> Claims 1-18 are rejected under *35 U.S.C. 103* as unpatentable over [the *'765* patent] . . . [which shows] producing amino acids by combining the DNA of a donor microorganism, such as E. coli, which has a mutation in the genes destroying the negative feedback, such as being resistant to an analogue of the amino acid, with a vector and transforming an E. coli mutant, which requires an amino acid, with the hybrid DNA to increase the amino acid production. The production of any amino acid, such as L-glutamic acid, and the appropriate mutant would be obvious since **such mutation techniques are conventional and well known.**

(PX 219 at 140) (emphasis added).

58. **Elements of Claims 1 and 2.** In order to practice claims 1 and 2 of the *'765* patent, a single chromosome fragment containing the genes controlling the synthesis of the selected amino acid must be isolated and obtained. (JX 1) According to Dr. Rudolph, in the late 1970's the biochemical pathways for amino acid synthesis in all bacterial species were not known; in particular, the method [*53] of regulation of the pathways was not known. (D.I. 313 at 939, 948, 1008-09; D.I. 314 at 1179-80) Although the steps in the biosynthetic pathway of an amino acid are generally the same across species, the regulation method varies from species to species. (D.I. 313 at 948) For example, the genes controlling the synthesis of threonine in E. coli differ from those in Corynebacteria, as does the method of regulation. (D.I. 314 at 944-48) In fact, some bacterial species cannot make certain amino acids. (D.I. 301 at 100)

59. Both Dr. Falkinham and Dr. Rudolph agreed that claim 1 calls for a single chromosome fragment containing the genes controlling the synthesis of a selected amino acid. (D.I. 308 at 311; D.I. 313 at 950-02, 963, 997) To isolate such a fragment, said genes must be contiguous. (D.I. 308 at 311; D.I. 313 at 963) However, all the genes controlling the synthesis of a selected amino acid are not always contiguous. (D.I. 313 at 1016; D.I. 313 at 947, 954, 997-98, 1009, 1041; DX 495) For example, although in E. coli the three genes of the threonine operon are contiguous as are the five genes of the tryptophan operon and the nine genes of the histidine operon, the [*54] genes controlling the synthesis of arginine and methionine are not contiguous. (D.I. 308 at 301; D.I. 313 at 997) And in Brevibacteria and Corynebacteria, the genes controlling the synthesis of threonine are located on separate, noncontiguous segments of the chromosome. (D.I. 313 at 944-48; DX 495; DX 1108 at 80) In fact, in E. coli, the asd gene, the product of which catalyzes the second step in the threonine pathway, is not contiguous with the genes of the threonine operon. (D.I. 313 at 947, 953-54, 1041, 1060-61; D.I. 314 at 1169) Therefore, with respect to E. coli, a single chromosome fragment cannot contain the asd gene and the threonine operon. (D.I. 308 at 323-24; D.I. 313 at 947, 1060-61)

60. In order to isolate the desired chromosome fragment, the appropriate restriction endonuclease must be employed. (D.I. 307 at 114–116; D.I. 313 at 950–53) Each endonuclease recognizes a unique sequence of basepairs in DNA, cutting only at those sites; therefore, cutting a particular DNA molecule with a particular restriction enzyme, such as BamHI or EcoRI, always yields a particular group of fragments. (D.I. 307 at 114–16) Once obtained, these fragments can be inserted [*55] into a plasmid that has been cleaved using the same restriction endonuclease, thereby generating insertion sites. (D.I. 313 at 950–53)

61. To isolate the hybrid plasmid carrying the chromosome fragment of interest, the plasmids are inserted into a recipient bacterial strain that is auxotrophic for the selected amino acid; through a complementation process (growth on a medium devoid of the desired amino acid), it is determined whether the hybrid plasmid carries the genes of interest. (D.I. 313 at 950–53) If the desired chromosome fragment is not isolated, the process must be repeated using a different restriction endonuclease. (D.I. 313 at 950–53) According to Dr. Rudolph, these techniques are routinely performed in the laboratory and it takes approximately one day to conduct one such sequence, from digestion with the restriction enzyme to selection of the desired strain. (D.I. 313 at 1058–59)

62. On cross examination, Dr. Rudolph testified that as of 1978 one of ordinary skill in the art would be able to use the basic in vitro techniques necessary for recombinant cloning, including how to use ligase and a ligation reaction and how to conduct restriction digest using restriction [*56] endonucleases. (D.I. 313 at 1047)

63. Claim 1 of the *'765* patent requires the use of a plasmid suitable for constructing a hybrid plasmid for transforming another bacterial strain. (JX 1) Although at the time of the invention, E. coli was well characterized and the plasmid pBR322 was readily available, plasmids suitable for making hybrid plasmids capable of transforming other bacterial species were not as well developed. (D.I. 313 at 998–99, 1007, 1009) According to an article authored by Dr. Debabov entitled Advances in the Genetic Engineering of Microorganisms, "the extension of genetic engineering techniques to . . . microorganisms [other than E. coli] requires additional investigation." (DX 165; DX 1100 at 132–33) Thus, at the time of the invention, the technology with respect to E. coli was more developed than it was for other industrial microorganisms. (DX 1100 at 132–33) For example, Dr. Rudolph testified that based on his experience with the bacteria Clostridium, plasmids suitable for use in transformation are not known for all bacterial species and therefore must be developed. (D.I. 313 at 998–9, 1007, 1009)

64. At the time of the invention, transformation [*57] techniques available for E. coli, although relatively well-known, were not universally applicable to other bacteria. (D.I. 313 at 958, 998–99, 1009, 1047) Dr. Rudolph testified that at that time he "had trouble in his own work with transformation." (D.I. 313 at 1048) According to an article authored by Konosuke Sano, senior chief scientist at Ajinomoto, entitled Host-Vector Systems for Animo Acid-Producing Coryneform Bacteria, the development of a host-vector system was necessary before recombinant DNA technology could be applied to Coryneform bacteria because the E. coli systems were not available. (DX 102 at 486) This concern was reiterated by Shukuo Kinoshita in a chapter he authored in Biology of Industrial Microorganisms, in which he stated that there exist various problems hindering the application of recombinant DNA technology for improving Coryneform glutamic acid producing bacteria. (DX 373 at 124–26) Similarly, Kiyoshi Miwa, head of the Pharmaceutical Biomedical Research Laboratory of the Applied Research Division of the Central Research Laboratory of Ajinomoto, admitted there were points which had to be "overcome" with respect to the expression of [*58] heterologous genes in Coryneform bacteria using plasmids capable of transforming the bacteria. (DX 1109 at 109–11, 117)

65. Claim 2 of the *'765* patent requires the use of a recipient bacterial strain having a mutation blocking the synthesis of the selected amino acid and a mutation partly blocking the related step of metabolism of said amino acid. (JX 1) The patent does not disclose the extent of the partial block necessary to practice the claimed invention or how to isolate a bacterial strain containing the two required mutations. (D.I. 313 at 1000–03, 1010–11, 1049–53; D.I. 314 at 1091–94, 1165, 1178) Even Genetika reported difficulty creating an ilvA mutation in two strains of bacteria, VL1991 and a derivative VL1997. (DX 79 at 9096)

66. Dr. Rudolph testified on cross-examination that one of ordinary skill in the art at the time of the invention would know how to use nitrosoguanidine as a mutagen to make specific mutants. (D.I. 313 at 1048) In addition, he testified that at the time of the invention, feedback resistant mutants were known in the literature. (D.I. 313 at 1049–50) He further opined that one skilled in the art **should** be able to isolate amino acid auxotrophic [*59] mutants, but that the ability to do so might vary from amino acid to amino acid and strain to strain. (D.I. 313 at 1049–50) Dr. Rudolph also opined that, in the context of the Tribe thesis and E. coli, one skilled in art at the time of the invention could have carried out these mutations for all twenty of the amino acids. (D.I. 1052–53)

F. The Availability of the Strains

67. There are four strains mentioned in the claims